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A Theory of Constitutional Standards and Civil Liberty

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Abstract

Why would potentially intolerant majorities in a democracy protect the rights of unpopular groups or minorities? This paper postulates a dynamic agency model in which potentially tolerant legal standards emerge over time, despite all individuals' having intolerant views. Individuals in society make repeated choices which have social impact. A majority vote each period determines which of these activities are protected. Imperfect observability or interpretability of these activities necessitates that the dominant groups will not impose standards which are too intolerant, otherwise they may end up severely punishing members of their own group by mistake. We examine the Markov Perfect equilibria of a dynamic game in which there is potential turnover in the dominant group, and government improves with time in its ability to correctly observe and interpret citizens' activities.

It is shown that societies with nonstationary population characteristics may be more amenable to stable and tolerant standards, while societies with stationary characteristics are more apt to choose more intolerant and unstable ones. Tolerant and stable standards tend to arise in response to a risk sharing motive between the different groups that tradeoff political power. Each group seeks to prevent auditing capabilities of government from improving too much over time in order to prevent future majorities from successfully enforcing more intolerant standards.

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1 Introduction

One primary role of a constitution is to limit to the discretionary authority of government. It is puzzling why governments do not regularly ignore or repudiate their constitutions whenever it is politically expedient to do so. Specifically, why do majorities in democracies respect the civil rights of those who hold unpopular views? Though there appears to be incentives to abrogate such rights, broad and tolerant legal standards for speech, religious practices, and other activities continue to have the force of law in U.S., England, and many other countries. England is a notable case since it has no formal constitution. Nevertheless, it does possess a long-surviving body of statutory law that seems to limit the power of the state.

In the U.S., constitutional scholars dating back to Madison have long recognized that any "demarcation on parchment" could not physically bind a government.[1] More prevalent is the view that a government's respect for the rights of its citizens is an explicit, possibly constrained, choice.[2] The present paper examines this view. We specify a dynamic environment in which potentially tolerant standards for civil liberty can arise in an electoral process despite the fact that all citizens have intolerant preferences.

To illustrate the idea, we consider the following stylized model. A large society is populated by individuals with different and philosophically incompatible preferences. Each period an individual chooses an action which has external consequences on the rest of society. For concreteness, consider two types: "atheists" and "fundamentalists." Each has different preferences concerning prayer in public school. A majority vote each period determines which activities are curtailed by the current government. However, activities of citizens are imperfectly observed or imperfectly interpreted. The latter can arise if, as is often the case, physical acts of individuals are interpreted in a larger context. The act of praying, for instance, involves a symbolic decision that goes beyond the clasping of one's hands together.[3]

This model is formally described in Section 2. The setup is similar to a standard principal-agent model with a few key differences. The decisive voter may be viewed as a principal who designs the contractual legal standard to influence the choices of the citizens (the "agents") at large. As in other agency models the principal cannot perfectly monitor the actions of agents.[4] Here, however, the principal is also one of the agents who must, himself, react to the standard. Interestingly, by seeking to modify the behavior of atheists, a fundamentalist votes for standards that push his own group toward a more extreme position than his ideal

[1] See James Madison in *The Federalist* #48.

[2] Again see Madison. See also Hamilton in *The Federalist* #84.

[3] Williams (1979) provides many such examples of constitutional dilemmas which arose in the U.S. for this reason.

[4] Other models of political agency include, for example, Barro (1973) and Ferejohn (1986).

one.

Due to the noise induced by imprecise auditing, the model shows that majority groups will not necessarily impose legal standards which stringently punish the minority groups for deviant behavior. The reason is that they may end up severely punishing their own group by mistake. Hence, preferences for some diversity arise endogenously from a voter's fear that his own behavior may be wrongly punished by a standard that is excessively intolerant . Each voter contemplates "what if it was me?" The chosen standards are therefore more tolerant the larger the noise in observing/interpreting citizens' activities. Indeed, the citizenry may be better off if government is not very accurate in observing/interpreting citizens' behavior. Hence, society may unanimously prefer an "inefficient" government along this dimension.[5]

Now suppose that this choice of legal standard occurs repeatedly. We extend the static framework to a dynamic one where successive majorities face two intertemporal forces. First, a government improves with time in its ability to correctly observe and interpret citizens' activities. With this possibility an unchanging government would choose increasingly intolerant standards. What prevents this scenario is a sufficient threat of loss of power due to changes in population characteristics. We characterize the Markov Perfect equilibria (MPE) of the stochastic dynamic game when these two countervailing forces are at work. In such equilibria, voters' choices are time consistent, and they condition only on a payoff relevent state variable. A *constitutional standard* is a steady state equilibrium path in which certain activities are never repudiated by successive governments.

Section 3 describes the dynamic model and the results. Our main result shows that when the common discount factor is close to one and when the rate of turnover in political power is large, then there is a MPE with infinite liberty allowed by the constitutional standard. On the other hand, when the rate of political turnover is sufficiently low, the constitutional standard then exhibits complete intolerance. In the latter case, all but the decisive voter's bliss activities are prohibited. In the school prayer example, this means that atheists are compelled to pray when fundamentalists hold power, and fundamentalists are forbidden to pray when atheists are in control.

The intuition for this result is simple: as in the politico-economic models of Persson and Svenson (1989), Alesina and Tabellini (1990), and Krusell, Quadrini, and Rios-Rull (1995, 1996), a voter cannot fully internalize the future consequences of his current decision. In the present model, this means that if the threat of political turnover is large, intolerant standards may backfire; smaller noise in interpreting future behavior leads to ever more intolerant standards in subsequent periods when the current majority loses power. Tolerant

[5]The idea that "inefficient" government is preferable after accounting for the optimal reaction of the citizenry has also been explored by Brennan and Buchanan (1977) and Krusell, et al. (1996).

standards therefore arise in response to a risk sharing motive between the different groups that tradeoff political power. Each group seeks to prevent auditing capabilities of government from improving too much in order to prevent future majorities from enforcing even more intolerant standards. This threat is diminished when the rate of turnover is low. A more tolerant standard admits fewer possibilities for future governments to learn from past precedents. Hence, with a large enough threat of turnover, the citizens prefer to keep the successive governments in relative ignorance.

Since a degree of tolerance emerges endogenously in society, the present paper is in the spirit of models of social conformity such as Bernheim (1994). There, social standards emerge as outcomes of a signalling game. As with here, each individual prefers that others conform to his most preferred philosophical position. However, in Bernheim's model an agent also derives utility from conforming independently of his own ideal. Here, individuals care only about their own ideals. Potentially tolerant constitutional standards emerge despite the citizens' preferences to the contrary.

Given the stylized nature of the model, it does not offer sweeping empirical implications on the nature of civil liberty. Nevertheless, the symmetric equilibria in the model do suggest one empirical regularity. Countries with frequent political turnover (due to, say, demographic changes) are more likely to have broad civil liberties. On the other hand, countries with low turnover will likely have intolerant and discretionary standards. Yet, the notion of "political turnover" implied by the model is very different from measures of "political instability" used by Alesina, et al. (1996), Londregan and Poole (1990), and Knack and Keefer (1995). This is understandable since their interest is in the relation between political instability and economic performance. Hence, their measures typically include turnover from assasinations, coups, revolutions, and other violent means.

By contrast, the current model assumes an electoral process and a functioning judiciary. Therefore, a more relevent relationship for our purposes is between peaceful transitions among different parties, groups, or factions on the one hand, and a measure of civil liberty on the other. Section 4 discusses some socio-political indices relevent to this relationship. There some weak evidence to support the implication. However, the relation between variables in the model and the data is tenuous.

Still, the aims of this paper concern mostly the theory. We seek to make endogenous the protection of civil liberty by current and future governments. Economics tools seem useful for this task. The present paper is best viewed then as a small step toward understanding how civil liberties are determined in a society.

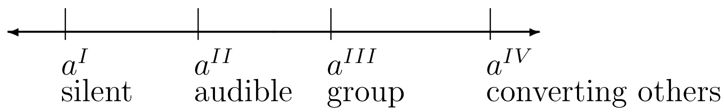

Figure 1: Increasingly Organized School Prayer

2 The Static Model

Consider a large society of infinitely lived individuals. For concreteness, we assume that there are two types of individuals called "atheists" and "religious fundamentalists." The distribution over types is given by $z = (z_1, z_2)$ with z_i denoting the proportion of individuals of type i. A person's type is his private information.

Each type differs widely on the issue of prayer in public school. An individual of type i chooses an activity a_i from some set A of possible "prayer" activities. For simplicity, we assume that A is some subset of the real line. In Figure 1 the set A linearly orders the degree of social impact of one's prayer in public school. Four possible activities $a^I < a^{II} < a^{III} < a^{IV}$ from this set denote, in ascending order, the extent to which a person's prayer (or lack thereof) impacts upon others. For example, a^I could be an act praying silently, a^{II} an audible personal prayer, a^{III} an audible group prayer, while a^{IV} corresponds to efforts to convert others.

Other examples which might fit this linear ordering of A include (1) speech and press advocating liberal versus conservative causes: a rightward move represents more "right-wing" speech; (2) religious rituals of different groups: a rightward move represents an increasingly public display of religious symbolism; or even (3) charitable contribution: a rightward shift represents increasing amounts given to homeless charities.[6] We stress that the ordering in each of these cases does not proceed from less tolerance to more tolerance. Rather, it is from the ideal activity of one group toward that of another.

The externality created by these activities are assumed to work through the average behavior $y = z_1 a_1 + z_2 a_2$ which would exist if all individuals of a given type chose the same action. Both types care about both their own individual behavior and this societal average. The utility of type i is denoted by

$$u^i(a_i, y) + m$$

The value m is a transfer/tax. Utility is measured in terms of a departure from some "bliss" or "ideal" behavior. Letting a_i^* denote i's bliss activity, his utility is uniquely maximal at $u^i(a_i^*, a_i^*)$ so that each type prefers that, in addition to his own choices, all individuals choose

[6] An individual whose bliss point is on the left may oppose such charitable giving by arguing that it increases dependency which has external consequences.

the same levels or type of public activities as he would. In figure 1, $a_1^* < a^I$ identifies the ideal point of an atheist. $a_2^* > a^{IV}$ identifies the ideal point of a religious fundamentalist. Each type is negatively affected by prayer practices widely different from his own philosophical position.

Formally, utility u^i is assumed strictly differentiably concave, and i's ideal point a_i^* satisfies $u_{a_i}(y, a_i^*) = 0$ and $u_y(a_i^*, a_i) = 0$ where u_{a_i} and u_y are derivatives with respect to a_i and y, resp. To simplify further, additive separability between y and a_i is also assumed so that cross derivatives are zero.[7] Finally, assume u_{a_i} and $u_y \to -\infty$ as a_i and $y \to \infty$, resp., and u_{a_i} and $u_y \to \infty$ as a_i and $y \to -\infty$, resp. The indifference contours of preferences of this form are shown in an example in Figure 2 below.

[Figure 2 here]

Given these preferences, in any majority vote the more populous type prefers to repress the preferred behavior of the other group. A *legal standard* is defined as a set $B \subseteq A$ of actions that are permissible in this society. If, for instance, $a^I \in B$, then the activity of praying silently in public school is currently protected from government regulation or prohibition. We assume that the legal description of standard B is public knowledge. The legal standard B is determined by majority vote. Type i is the more populous group if $z_i > z_j,\ j \neq i$. Henceforth, an individual from the more populous group will be referred to as the *decisive voter.*

Clearly, a legal standard cannot be permissive in a world of perfect information. If, say there are more fundamentalists than atheists, then the decisive voter is a fundamentalist who therefore chooses the most intolerant standard possible which is simply his ideal point $\{a_2^*\}$. Deviations from this standard are then subject to prohibition. Hence, in the perfect information case, whenever type i is the majority type, type i chooses $B = \{a_i^*\}$.

The potential for tolerant standards arises if society imperfectly observes or imperfectly interprets each citizen's intended actions. We assume that while a_i is the intended action of an individual of type i, it is not observed by the populace. Instead, a_i generates a noisy signal $x_i \in A$ which is observed.[8] If a type i individual intends to choose activity a_i then the distribution over his observed behavior is given by $F(\cdot|a)$, which is also the distribution

[7]Parametric examples of utility functions of this type are $u^i = -(a_i^* - a_i)^2 - (a^* - y)^2$, and $u^i = exp^{-(a_i^* - a_i)^2} + exp^{-(a^* - y)^2}$.

[8]As in other agency problems, since a_i is i's actual behavior, utilities depend on it rather than on the observations x_i.

of observed signals for the population if all type i individuals take the same action a_i.[9] Let f denote the continuously differentiable density of F.

The distributions are assumed to satisfy the first order stochastic dominance property, $F_{a_i}(x|a_i) \leq 0$, where F_a denotes dF/da. It is also assumed that $E[x_i|a_i] = a_i$, and F is a symmetric, unimodal distribution. We let σ denote a parameter which, together with a fully characterizes the class of distributions $\{F(\cdot|a)\big|\ a \in A\}$. Increases in the parameter σ correspond to a mean preserving spread of f. The class of normal distributions conform to this parameterized class. A value of $\sigma = 0$ means that $f(\cdot|a)$ assigns full mass to activity a. For now the class of distributions is assumed to be part of the description of the environment. The following assumptions will be used in the analysis.

(A1) For each type i, $\frac{f_{a_i}(x|a_i)}{f(x|a_i)}$ is strictly increasing in x, and $\frac{f_{a_i}(x|a_i)}{f(x|a_i)} \to \infty$ (resp., $\to -\infty$) as $x \to \infty$ (resp., $x \to -\infty$).

(A2) Let f^σ denote the explicit dependence of the density on the noise parameter σ. Then for all types i,

$$\frac{d}{d\sigma}\left|\frac{f^\sigma_{a_i}(x|a_i)}{f^\sigma(x|a_i)}\right| < 0. \tag{1}$$

Assumption (A1) is the familiar Monotone Likelihood Ratio Property (MLRP) common to most agency models, as well as some typical limit properties of the likelihood ratio.[10] As in other agency models, the MLRP property is needed here to establish monotonicity of the contract in the contracting variables. It will also be used to establish interior solutions to the contractual problem below. Assumption (A2) asserts that the likelihood ratio is decreasing in the noise of the signal. The role of (A2) will be to establish monotonicity of the contractual standard in the amount of noise in the system.[11]

If an individual's observed behavior fails conform to the behavior standard, then the state imposes a punishment $C > 0$, the cost of violating the standard. For now we assume that the monitoring and legal system is exogenous. Given C and a chosen standard B, the expected cost to individual i of choosing intended action a_i is $C \int_{A \setminus B} f(x|a_i)dx$, where $A \setminus B$, the complement of B in A, is the set of activities which are punishable by government.

Before proceeding further, a few comments may clarify the motivation for these assumptions. First, limiting our scope to a single, linearly ordered issue is restrictive (the issue of

[9] This argument utilizes a "law of large numbers" which is problematic if the population is literally described by a continuum.

[10] See Hart and Holmstrom (1986).

[11] Both Properties (A1) and (A2) are easily verified to hold for the class of Normal distributions with mean $a \in \Re$ and variance $\sigma^2 > 0$. In this case, the likelihood ratio is given by $\frac{f^\sigma_{a_i}(x|a_i)}{f^\sigma(x|a_i)} = \frac{2(x-a_i)}{\sigma^2}$.

school prayer itself is not so well ordered). However, this assumption vastly simplifies the analysis. At some point, a richer analysis of a multi-dimensional range of issues is worthwhile, but it would make the workings of the model far less transparent.

Second, the two types assumption is seems specialized, but could probably be relaxed. With more than two types, preferences over standards will turn out to be single peaked and so the Median Voter Theorem of Black can be used with more than two types.

Third, while our assumptions are close to those in standard agency models, the interpretation is necessarily different. In agency models, the agent's physical behavior is unobservable. In the present model, society may observe the physical dimensions of acts, but not the symbolic ones. Societies typically interpret physical acts in a larger context. For example, in the U.S. if a private citizen blocks someone's use of the street with the motive of robbing him, there is no constitutional issue. But if he blocks the use of the street with the intention of stoppping that use, this is a violation of the statute protecting the constitutional right to use the street.[12] The source of noise then is the uncertainty associated with the interpretation of the symbolic act since symbolic language need not have a universally understood meaning.

Finally, it is restrictive to limit that the contractual design to a single threshold. In effect, we are assuming that agents are uniformly punished outside B. A more general form of contract would tailor the cost C to vary with the difference between observed and "ideal" behavior (the "punishment should fit the crime"). The form of contract is kept simple largely for tractability and because it does not detract from the dynamic part of the model.

The Citizen's Problem

Given a standard B each citizen of type i solves

$$\max_{a_i} \left[u^i(a_i, y) - C \int_{A \setminus B} f(x|a_i) dx \right] \tag{2}$$

If (2) is strictly concave in a_i (a standard assumption in agency theory) the first order condition

$$u_{a_i} = C \int_{A \setminus B} f_{a_i}(x_i|a_i) dx_i \tag{3}$$

determines a global maximum of (2) and the "first order approach" in the subsequent decisive voter's problem is valid. We assume that for each type i and each $j \neq i$, punishment C is sufficiently large to satisfy

$$u^i(a_i^*, z_1 a_1^* + z_2 a_2^*) - C < u^i(a_j^*, a_j^*) \tag{4}$$

[12] United States vs Guest, 383 U.S. 745 (1966).

The first payoff in this inequality is i's payoff if j is the decisive voter, i takes his ideal activity, and there is no noise in auditing behavior so that i is fully punished for his "deviant behavior." The right hand payoff is i's payoff if he fully conforms under the same scenario. Hence, the solution to (2) has type i fully conforming to j's ideal if there is no noise.

The Decisive Voter's Problem

If (3) determines the solution to the citizen's problem[13] then the decisive voter's problem may be given by

$$\begin{aligned} \max_{a_1,a_2,B} \quad & u^i(a_i, z_1a_1 + z_2a_2) - C\int_{A\setminus B} f(x|a_i)dx \\ \text{subject to} \quad & u_{a_i} = C\int_{A\setminus B} f_{a_i}(x|a_i)dx,\ i = 1,2 \end{aligned} \tag{5}$$

Observe that the larger is B the more tolerant is the legal standard. Without the externality, i.e., if $y_i = a_i$, then $B = A$ is a solution to (5) since restricting the standard can only harm the decisive type due to the noise in the monitoring system. On the other hand, without the agency problem, i.e., if $\sigma = 0$, then $B = \{a_i^*\}$ solves (5) since externality induces the decisive voter to choose the most intolerant standard possible. Hence, the optimization problem (5) identifies a tradeoff which is central to determining what standards are chosen. On the one hand, one group's preferred behavior negatively affects another group, and so the dominant group prefers to repress the preferred behavior of the other group. On the other hand, imperfections in the ability to verify unwanted behavior prevents the standard from being too restrictive. In essence, restrictive standards may backfire against members of the dominant group. Hence, the solution to (5) balances the need for stringency from the externality with the need for laxity from the noisy signal.

A Characterization

Proposition 1 *Let A denote the entire real line and suppose that (A1) holds. Suppose that type 1 is decisive. Then: (1) any chosen standard B is of the form $(-\infty, x^*]$ or $[x^*, \infty)$ depending on whether $a_1^* < a_2^*$ or $a_1^* > a_2^*$, resp.; (2) the decisive voter's problem has an interior solution so that $-\infty < x^* < \infty$; (3) whenever $B = [x^*, \infty)$ is chosen by the decisive voter from the more populous group 1 then*

$$a_2^* \; < \; a_2 \; < \; y \; < \; a_1^* \; < \; a_1. \tag{6}$$

[13] Given a distribution F, a sufficient condition for the "first order approach" to be valid is that utility u^i satisfies $\min_{a_i} |u^i_{a_ia_i}(a_i, y)| > \max_{a_i} |CF_{a_ia_i}(x|a_i)|$.

Similarly, whenever $B = (-\infty, x^*]$ is chosen then

$$a_1 < a_1^* < y < a_2 < a_2^*; \tag{7}$$

Finally, (4) suppose that (A2) also holds. Suppose that utility functions across types differ only by the location of ideal points a_1^* and a_2^*. Then the breadth of the standard $|B|$ is increasing in z_1. Moreover, if z_1 is sufficiently large (and so z_2 is sufficiently small), then $|B|$ is increasing in the signalling noise σ.

The proof of this as well as all subsequent results are in the Appendix. A standard result of agency theory establishes that the first order constraints bind. This means that the decisive voter generally cannot attain his ideal (first best) behavioral response. The inequalities in (6) and (7) suggest that by modifying the behavior of the minority type, the decisive type cannot help but modify the behavior of his own faction as well. As a consequence of forcing atheists to moderate their behavior, a fundamentalist voter must therefore force other fundamentalists to practice more extreme fundamentalism than would be ideal for the group.

Part (4) of the result addresses two important comparative statics issues. First, the result shows a standard to be more tolerant the more dominant is the decisive group. Suppose fundamentalists are decisive. Then, when z_1 is large the aggregate effect of the actions of a small number of atheists is small. In this case the possibility of mistaken punishment is the primary concern to fundamentalists. Second, the result examines whether the standard is more tolerant the larger the noise in interpreting the standard. This turns out to be the case under Assumptions (A1) and (A2) if one's own group is sufficiently dominant in the population. To see why this is so, suppose that $a_1^* > a_2^*$. Then the first order conditions in the standard B can be expressed in terms familiar to principal-agent models:

$$-\lambda_1 \frac{f_{a_1}(x^*|a_1)}{f(x^*|a_1)} - \lambda_2 \frac{f_{a_2}(x^*|a_2)}{f(x^*|a_1)} = 1 \tag{8}$$

where λ_i denotes the Lagrangian multiplier for the type i agents' first order constraint. The solution x^* which determines the legal standard $B = [x^*, \infty)$ is one in which the weighted sum of likelihood ratios is unity. Since the weight λ_i increases with i's proportion z_i in the population, the relative impact of a change in the bound x^* depends on the size of the minority faction. Hence, if the external effect of a change on the opposing faction is small, then the negative effect of an intolerant standard on one's own group when there is more noise is larger. On the other hand, when the minority faction is large enough, then an intolerant standard induces a larger behavioral response from this faction when there is more noise. In this case, the effect of a noisier signal is ambiguous.

3 Dynamic Model

Assume that time is discrete, $t = 1, 2, \ldots$, and suppose that society faces this voting and agency problem each period. The noise parameter is given by σ_t in period t. For technical reasons we will find it necessary to assume that actions a are chosen from a fixed grid, A, of the real line (e.g., the set of integers). In each period, a half interval B_t with an end point on the grid is chosen by the current majority. The past history of repudiations is summarized by a state variable

$$\mathcal{B}_t = \bigcap_{\tau < t} B_\tau.$$

Recursively, we have $\mathcal{B}_{t+1} = \mathcal{B}_t \cap B_t$. The measure $|\mathcal{B}_t|$ is a natural way of determining how tolerant is a society over time. The activities in $\mathcal{B}_t$ describe the largest range of permissible conduct that has never been violated by the government up to that point. Naturally, an existing government may choose $B_t \supset \mathcal{B}_t$ refusing to punish certain behavior even if a previous government had done so in the past. It may also be the case that $\mathcal{B}_t = \emptyset$ which is true if successive governments have implemented standards which are inconsistent with one another's.

Since the agency problem is repeated each period, it is natural to presume that the government's observation error might, other things equal, resolve itself over time. A government could, for example, draw from a data base of past violations in order to more accurately interpret the current behavior of its citizens. If, for example, silent prayer on school property is protected generally but audible prayer during organized class time is not, then the uncertainty associated with legal interpretations of the terms "prayer", "silent", and "organized class time" would become clear over time as legal precedents are accumulated from challenges of those who are accused of violating the standard.

To capure this learning-by-doing role of law, we assume that the noise parameter σ_t evolves with changes in the constitutional standard. Suppose that the noisy signal of each type is given by $x_{it} = a_{it} + \theta_t$ where θ_t is the government's resolution error with mean zero and variance σ_t^2. At time t the cumulative number of repudiated activities is given by $|\mathcal{B}_0 - \mathcal{B}_t|$. Hence, the cumulative reduction in "liberty" is also $|\mathcal{B}_0 - \mathcal{B}_t|$. Note that each repudiated activity gives rise to a case that must be adjudicated. Hence, in each period, there are $\mathcal{B}_t - \mathcal{B}_{t-1}$ new cases to be adjudicated. Suppose that each adjudicated case reduces the standard error by some fixed amount γ. That is, each case refines of the existing language of the law by a fixed amount for more accurate auditing in the future. Then since only those potential errors in $\mathcal{B}_0 - \mathcal{B}_t$ are adjudicated, it follows that $\sigma_0 - \sigma_t = \gamma |\mathcal{B}_0 - \mathcal{B}_t|$. Fixing the initial state $\mathcal{B}_0$ the reduced form of this technology can be described by

$$\sigma_t = G(\mathcal{B}_t) \tag{9}$$

where G is assumed increasing in the breadth $|\mathcal{B}_t|$ of the standard, and $G(\mathcal{B}_t) = 0$ whenever $|\mathcal{B}_t| = 0$. The government then becomes more accurate in interpreting intended behavior the smaller (more intolerant) is the existing cumulative standard. If the current constitutional standard is negligible or nonexistent then there is assumed to be no noise in the monitoring system. This last assumption amounts to a normalization since it establishes a baseline of zero for the agency problem if extremely intolerant standards are chosen.

Unfortunately, this specification does not eliminate an endemic problem of learning-by-doing models which is that the exact process of learning is not explicit. The above has the shortcoming that the degree of technological improvement is independent of the specifics of the case.[14] A more natural theory of legal capital accumulation is the subject for a separate paper. The present specification is an interim solution which allows us to focus on consequences for tolerant standards.

With eventual elimination of auditing imperfections, a decisive fundamentalist could reach his ideal payoff $u_i(a_1^*, a_2^*)$ by imposing an increasingly intolerant standard. If he is sufficiently patient and likely to remain decisive, then he would surely do so. However, we assume a population dynamic which presents the currently decisive voter with the threat of losing power. Assume that the distribution (z_{1t}, z_{2t}) evolves according to a simple stationary Markov switching process with transition probability given by $p = \text{Prob}\{z_{it} > z_{jt} | z_{i\ t-1} > z_{j\ t-1}\}$ which is the probability of i being decisive if i was decisive in the previous period. It is assumed that there are two possible distributions: (z_1', z_2') in which $z_1' > z_2'$, and (z_1'', z_2'') in which $z_1'' < z_2''$. With probability $1 - p$ the dominant group loses power to the other group.

3.1 Markov Perfect Equilibrium

The effect of population and technological changes is to enforce restraint on the part of the current majority. The *Markov Perfect equilibria* of this dynamic game show how the mechanics of the process works. In these equilibria, a strategy for a voter/citizen must be optimal after every history, but the strategy depends only on the payoff relevent information at the time a decision is made. Markov Perfection is motivated by the presumption that complicated social norms which depend on past histories is less likely in a large population. The only payoff relevent information each period is the existing standard $\mathcal{B}_t$ (which, in turn, generates the current noise parameter), and the decisive voter's type. Hence, two individuals of the same type have the same state contingent behavior.

[14] Note that the "blackbox ambiguity" of the legal capital accumulation technology cannot be simply resolved by a model of Bayesian updating. For the ambiguity would then lie in the specification of the likelihood function.

Now let $U_i(B,\sigma)$ denote the indirect utility of $u^i(a_i, z_1a_1+z_2a_2) - C\int_{A\setminus B} f^\sigma(x|a_i,\sigma)dx$ when each $a_i,\ i=1,2$ is chosen optimally to solve the citizen's problem (2) given standard B and the dependence of f on noise parameter σ. Next, let variables with primes denote next period's variables so that $\mathcal{B}' = B\cap\mathcal{B}$ denotes the constitutional standard in period $t+1$ given that B is chosen in the current period t. A *Markovian* strategy for a voter of type i is a function $\mathcal{S}^i$ which maps from the existing constitutional standard $\mathcal{B}$ to a newly chosen standard $B=\mathcal{S}^i(\mathcal{B})$. Let $\mathcal{S}=(\mathcal{S}^1,\mathcal{S}^2)$ denote the pair of such strategies, one for each type.

Let $V_i(\mathcal{B}|\mathcal{S})$ denote the value to type i if he is the decisive voter at the time, if the constitutional standard is $\mathcal{B}$, and if both types follow strategy tuple $\mathcal{S}$. Finally, let $W_i(B,\mathcal{B}|\mathcal{S})$ denote the value to type i if $j\neq i$ is the decisive voter at the time and chooses standard B given that the current constitutional standard is $\mathcal{B}$. The recursive formulation of these payoffs are defined as follows: given any B, $\mathcal{B}$, and $\mathcal{B}'=B\cap\mathcal{B}$, values W_i and V_i satisfy:

$$W_i(\mathcal{B},B|\mathcal{S}) \;=\; (1-\delta)U_i(B,G(\mathcal{B}))+\delta[(1-p)V_i(\mathcal{B}'|\mathcal{S})+pW_i(\mathcal{B}',\mathcal{S}^j(\mathcal{B}')|\mathcal{S})] \tag{10}$$

and

$$V_i(\mathcal{B}|\mathcal{S}) \;=\; (1-\delta)U_i(\mathcal{S}^i(\mathcal{B}),G(\mathcal{B}))+\delta[pV_i(\mathcal{B}'|\mathcal{S})+(1-p)W_i(\mathcal{B}',\mathcal{S}^j(\mathcal{B}')|\mathcal{S})] \tag{11}$$

where δ is the common discount factor. In each of these expressions the dynamic payoff V and W have been normalized so that they may be expressed as convex combinations static payoffs. The recursive expression for W_i consists of a weighted average of i's current payoff $U_i(B,G(\mathcal{B}))$ and the continuation values, each depending on who holds power in the subsequent period. Under W_i, type i cannot affect his current payoff by his strategy $\mathcal{S}_i$ since he is not decisive. Therefore, i's current payoff in the construction of W is precisely the indirect utility from the citizen's problem (2). In the expression for V_i, since i is assumed decisive in the definition of V_i, he chooses the current standard $\mathcal{S}^i(\mathcal{B})$ which determines next period's constitutional standard, $\mathcal{B}'=\mathcal{S}^i(\mathcal{B})\cap\mathcal{B}$.

A *Markov Perfect equilibrium (MPE)* is a pair $\mathcal{S}=(\mathcal{S}^1,\mathcal{S}^2)$ such that for each decisive voter i, each constitutional standard $\mathcal{B}$, and each alternative legal standard $\hat{B}^i$,[15]

$$V_i(\mathcal{B}|\mathcal{S}) \;\geq\; (1-\delta)U_i(\hat{B}^i,G(\mathcal{B}))+\delta\left[pV_i(\mathcal{B}\cap\hat{B}^i|\mathcal{S})+(1-p)W_i(\mathcal{B}\cap\hat{B}^i,\mathcal{S}^j(\mathcal{B}\cap\hat{B}^i)|\mathcal{S})\right]$$

The *Perfection* part of the definition of MPE builds in the inability of the decisive voter to commit to future standards that he might be able to choose. Rather, the current decisive voter takes as given future state contingent choices made by, what Krusell and Rios-Rull describe as, "his future self," as well as the rival type's future selves.

[15]It can be checked that this definition of Markov Perfection is equivalent to the more familiar one in which $V_i(\mathcal{B}|\mathcal{S})\geq V_i(\mathcal{B}|\hat{\mathcal{S}}^i,\mathcal{S}^j)$ for each $\hat{\mathcal{S}}_i$ where $\hat{\mathcal{S}}_i$ is any possibly nonMarkovian, strategy.

Proposition 2 *Given any initial state $\mathcal{B}_0$ with finite support, there exists a Markov Perfect equilibrium.*

3.2 Steady States as Constitutional Standards

For any initial condition B_0, the initial noise is given by $\sigma_0 = G(B_0)$. From there, a Markov Perfect equilibrium $\mathcal{S} = (\mathcal{S}^1, \mathcal{S}^2)$ induces a path $B_1, B_2, \ldots$, of chosen standards where $B_t = \mathcal{S}^i(\mathcal{B}_t)$ if i is decisive in period t.

A *steady state of a MPE*, $\mathcal{S}$, is a pair of standards (B^1, B^2) determined by types 1 and 2, resp., such that $G(B^1 \cap B^2) = \sigma$ and the payoff to the decisive type is determined by solving for V_i under the time invariant pair (B^1, B^2). This is given by

$$\bar{V}_i(B^1, B^2) \;=\; \alpha_{\delta,p}\, U_i(B^i, \sigma) \;+\; (1 - \alpha_{\delta,p}\,)U_i(B^j, \sigma) \tag{12}$$

where $\alpha_{\delta,p} = \frac{1-\delta p}{1+\delta-2\delta p}$. The steady state defines a two state Markov process with states B^1 and B^2, and the probability of switching from B^1 to B^2 (and vice versa) in the subsequent period is $1 - \alpha_{\delta,p} = \frac{\delta(1-p)}{1+\delta-2\delta p}$. The payoff in (12) is a convex combination between i's utility given his choice B^i, and i's utility under type j's chosen standard B^j when the signalling noise is σ . The weights on each are determined by the discount factor δ and the political retention rate p. Observe that $\delta \to 1$ and $p \to 1$ increase the weight $\alpha_{\delta,p}$ on the decisive type's utility under his own standard, while decreasing the wieght on his utility under the other standard.

Notice that since the chosen standard depends on who holds power, it is not time invariant in the steady state. However, the state variable $\mathcal{B} = B^1 \cap B^2$ in the steady state *is* time invariant. For this reason, it may be regarded as having acquired a constitutional status. It describes widest range of conduct that is never repudiated as the political winds change.

If this steady state $\mathcal{B}$ turns out to be a nonnegligible interval, then each type's standard admits an interval of activities not repudiated by the other type's standard in steady state. A general property of MPE is that the payoff of the median voter aways converges to something of the form (12).

Proposition 3 *Every MPE $\mathcal{S}$ converges to a steady state (B^1, B^2) with steady state payoff to the decisive type given by $\bar{V}_i(B^1, B^2)$.*

The steady state payoff to the currently less populous type is symmetric with the weights reversed:

$$\bar{W}_i(B^1, B^2) \;=\; (1 - \alpha_{\delta,p}\,)U_i(B^i, \sigma) \;+\; \alpha_{\delta,p}\, U_i(B^j, \sigma)$$

Suppose that a steady state of $\mathcal{S}$ satisfies $|B^1 \cap B^2| = 0$. In this case there is no tolerant constitutional standard. In such equilibria, by the Assumption (B2), the noise converges to zero. In the limit, since $\sigma = 0$ the median voter of type i always chooses his bliss activity $\{a_i^*\}$ to be his standard. When this happens the steady state payoff to the decisive voter of type i is given by

$$\underline{V}_i \;=\; \alpha_{\delta,p}\; u^i(a_i^*, a_i^*) \;+\; (1 - \alpha_{\delta,p})\; u^i(a_j^*, a_j^*) \tag{13}$$

where $j \neq i$. In (13) the payoff is a convex combination of i's bliss utility and i's utility under type j's bliss societal activity. Call $\underline{V}_i$ the *repudiation payoff* to type i since this is the payoff if all activities are fully repudiated when there is no noise. Similarly define $\underline{W}_i$ to be i's repudiation payoff when j is decisive.

Suppose that utility functions across types differ only by the location of ideal points a_1^* and a_2^* and let $a_1^* > a_2^*$. Suppose also that $\bar{z} = z_1' = z_2''$ so that the degree of decisiveness does not vary with the identity of the decisive type. Consider a steady state (B^1, B^2) in which $B^1 = [a_1^* - r, \infty)$ and $B^2 = (-\infty, a_2^* + r]$. This steady state is symmetric in the sense that each type would choose the same solution r were he the decisive voter. Denote the steady state signalling noise by σ_r where $\sigma_r = G(\mathcal{B}_0 \cap [a_1^* - r, a_2^* + r])$. Consider the following program for type 1:

$$\mathcal{P}: \quad \sup_{r \in A} \quad \alpha_{\delta,p}\, U_1(\ [a_1^* - r, \infty), \sigma_r\ ) \;+\; (-\alpha_{\delta,p})\, U_1(\ (-\infty, a_2^* + r], \sigma_r\ ) \tag{14}$$

An analogous program can be specified for type 2. Note that if $r = 0$ then the all activities are repudiated, and so society is completely intolerant (recall, $a_1^* > a_2^*$). But if $r = \infty$ then the entire grid is protected, and so the legal standard is infinitely tolerant. Because the symmetry is imposed prior to the voter's optimal decision, the decisive voter effectively chooses a uniform standard to apply both for when he holds and does not hold power. For this reason, a solution to program $\mathcal{P}$ is not generally attainable by a Markov Perfect equilibrium. However, our main result establishes that the solution to $\mathcal{P}$ *can* be approximated to an arbitrary degree by an MPE if the voters are patient enough.

Proposition 4 *Let $\epsilon > 0$. For a sufficiently large discount factor δ, there is some MPE $\mathcal{S}$ in which the payoff $V_i(B_0|\mathcal{S})$ to the decisive voter is within ϵ of the value to the program $\mathcal{P}$. For each discount factor, if the probability p of retaining power is sufficiently small then $r = \infty$ is a solution to program $\mathcal{P}$; if the retention probability p is sufficiently large then $r = 0$ is a solution to $\mathcal{P}$.*

If it is very likely that the current decisive voter loses power, then an equilibrium exists with an infinitely tolerant constitutional standard ($r = \infty$). The payoff in this case is approximately $\frac{1}{2}u_i(a_i^*, \bar{z}a_i^* + (1-\bar{z})a_j^*) + \frac{1}{2}u_i(a_i^*, \bar{z}a_j^* + (1-\bar{z})a_i^*)$. Each individual chooses his bliss activity. If, on the other hand, the current decisive voter retains power permanently, then the standard is completely intolerant, resulting in the repudiation payoff in equation (13).[16] This range of behavior may be contrasted with the case where the discount factor is small. In that case, the dynamic game is approximately a sequence of one-shot games with the population dynamic determining the decisive voter each period. For small enough δ the static result from Proposition 1 holds: homogeneous societies will have broader civil liberties since the externality created by the rival minority group is small. In this case, society may be driven down to the repudiation stready state eventually, but it may take a while.

The problem with Proposition 4 is that the threshold discount factor depends crucually on the size of the grid A. The finer the grid, the more patient the voters must be in order to approximate the value of program $\mathcal{P}$ in equilibrium. If δ is close to one, then the payoff difference between this period's and next period's decisive voter is negligible in the current period. Hence, successive governments share virtually the same (long run) objective function each period. This is despite the fact that only one type has absolute power every period. If patience is coupled with imminent loss of loss of power, then philosophically opposed groups virtually share the same objective for highly tolerant legal standards.[17]

For more general parameters, individuals' payoffs $V_i(\mathcal{B}|\mathcal{S})$ have the same (ordinal) rankings over $\sigma = G(\mathcal{B})$. However, individuals' preferences over $\mathcal{B}$ itself conflict since each type prefers that a given sized interval of protected activities is closer to his own ideal behavior. Hence, there is some common interest due to noise/auditing which allows Pareto improving "cooperation".

Nevertheless, equilibria in the present model are not generally Pareto optimal. The inherent conflict of interest in the location of the standard prevents full Pareto efficiency unless behavior is nonMarkovian. The reason is that Markovian behavior does not allow sufficient coordination to enforce perfect risk smoothing and drive the signalling noise to zero. To see why, notice that $\sigma = 0$ means $|B| = 0$ and so Markovian strategies must be a constant function from that point onward. Yet, if strategies are constant functions then punishments are not possible. Consequently each type would surely choose his ideal point whenever he is the decisive voter. If, on the other other hand, the state space was large enough to include the past history of play, then certain trigger strategies could support virtually any payoff in a Perfect equilibrium[18] The extent of Pareto improvement over repudiation therefore depends

[16]Since $\alpha_{\delta,p} \to 1/2$ as $\delta \to 1$, the result is somewhat sensitive to the order in which limits are taken. For the transition probability p to matter, the discount factor δ must be strictly less than 1.

[17]The general property that patient types have the same ranking over continuation payoffs is sufficient to prove that there are efficient Markov Perfect equilibria. See Dutta (1996) for details.

[18]See, for example, Abreu (1988), Abreu, Pearce, and Stacchetti (1986), and, Dutta (1995).

on the relative effects of the common interest versus the conflict of interest attribute of the state variable.

Though the Markovian assumption is restrictive, it has the virtue that it does not assume costless coordination by the citizenry on the past history of play. The focus instead is on the role of the constitutional standard as the coordinating device. This is consistent with Buchanan (1975), Hardin (1989), Weingast (1996), and others who also examine the coordinating role of constitutions.

4 Discussion

One of the most widely recognized measures of civil liberty is the index compiled by R. Gastil and the Freedom House Survey (Gastil (1986)). The Survey periodically ranks the civil liberties of a large sample of countries on an ordinal scale from 1 to 7. A "1" ranks as the most free and tolerant, while a "7" is the least. The index is based on a broad range of criteria from religious freedom to press censorship.

If the implications of the symmetric equilibria hold up then societies with likely or frequent, peaceful transitions of power will have broader notions of civil liberty, hence a lower score in the civil liberties index, than those with infrequent or unlikely transitions. Using the Freedom House/Gastil data from 1978, Bilson (1982) found that among a sample of 70 countries which used some type of electoral process, the average score among countries classified as having an active multi-party system was 2.28 (0.15), while the average score among countries classified as having a dominant party was 4.61 (0.32).[19] The difference in scores should not be over-emphasized, however, since the index is purely ordinal. We cannot say by how much a viable political opposition increases civil liberty in a country. Moreover, many factors could account for the difference.[20]

Since the model addresses questions of tolerance only for those societies with open and impartial elections, it is worth a look at the civil liberty indices of the 25 countries that scored better than a "3" in the political rights index from the Freedom House Survey. These are countries judged to have a reasonably fair electoral process.[21] In Table 1 below, the first

[19]Standard errors are in parenthesis. Of the total, 81% were classified as "multi-party" while 19% were classified as "dominant party." See Gastil or Jodice and Taylor for precise criteria for these classifications.

[20]If, by abrogating civil liberties, the current government makes opposition more difficult, then the causal relation works in reverse.

[21]A score of 1 or 2 indicates systems with an "open process." A score of 3 indicates "political systems in which people may elect their leaders or representatives, but in which coups d' etat, large scale interference with election results, and often nondemocratic procedures occur." See p. 60, Vol. 1 of Jodice and Taylor.

column contains the precise score of political rights for these countries. The second column contains the civil rights index. All scores are averaged from 1973 to 1979. The final column measures the degree of party fractionalization for the same period. This is the likelihood that two randomly selected voters will belong to different parties. Jodice and Taylor (1983) compile this data using the formula: $F = 1 - \sum_{i=1}^{k}(\frac{n_i}{N})(\frac{n_i}{N-1})$ where n_i is the number of votes for party i out of N total votes cast.

[Table 1 here]

The last column is a reasonable proxy for the dominance of any single party during the elections for this time period. The correlation between the civil rights score and fractionalization is indeed negative (more fractionalization indicates lower scores which means more tolerance). However, the relation is quite weak with correlation coefficient of -.08914. Better definitions of political turnover do exist but, unfortunately, the data appears unreliable.[22]

There are clearly limitations in the current model. One problem is that the population turnover is exogenous. If intolerant legal standards prevent opposition groups from organizing, then these groups may be unable form electoral majorities in the future. This may give an additional incentive to the dominant group to impose more stringent standards now. Moreover, sufficiently oppressive laws may induce violent responses by the opposition. The range of these possibilities is clearly beyond the scope of the present paper. Although the model has limited the applicability for this reason, it does manage to focus attention on the harder-to-explain differences in civil liberty between countries that are governed by rule of law.

Another limitation is with the learning-by-doing specification. As with other models of learning-by-doing technologies, the legal capital accumulation is a black box. A more complete analysis would address precisely how legal precedents reduce the auditing uncertainty. Finally, the explicit aggregation procedure is fixed and not subject to change. Others have studied policy implications of particular procedural aspects such as fiscal restrictions, exclusion rules, and frequency of elections.[23] Since the turnover and degree of decisiveness play a crucial role, changing the electoral frequency or the voting threshold will have a large effect in the current model. Future efforts at integrating these features seem fruitful.

[22]Jodice and Taylor compile a series called "Regular Executive transfers." This series reports the number of peaceful, electoral transfers of power from one party to another since 1948. Unfortunately, the numbers do not appear accurate. Israel, for example, is reported to have high turnover rate prior to 1977, despite the fact that the Labor party held power continuously from 1948 until 1977. They data also indicate a transition in the U.S. in 1974 (Nixon's resignation?). Yet, the Republicans kept the presidency that year. Other discrepencies abound.

[23]See, for example, Green (1993), Krusell and Rios-Rull (1994), Persson and Tabellini (1996), and Jehiel and Scotchmer (1997).

5 Appendix: Proofs of the Results

Proof of Proposition 1 We first prove (1) and (3). The first order conditions in actions a_1, a_2 from the decisive voter's problem (5) give

$$z_1 u_y^1 = \lambda_1 \left[C \int_{A \setminus B} f_{a_1 a_1}(x|a_1) dx - u^1_{a_1 a_1} \right] \tag{15}$$

$$z_2 u_y^1 = \lambda_2 \left[C \int_{A \setminus B} f_{a_2 a_2}(x|a_2) dx - u^2_{a_2 a_2} \right] \tag{16}$$

From these conditions we show that the Lagrangian multipliers λ_1 and λ_2 must have the same sign and are nonzero. Since the term $\left[C \int_{A \setminus B} f_{a_i a_i}(x|a_i) dx - u^i_{a_i a_i} \right]$ is always positive due to strict concavity of the citizen's problem, it must follow from equation (15) that $\lambda_1 > 0$ implies that $u_y^1 > 0$, and hence $\lambda_2 > 0$. Hence, either $\lambda_1 > 0,\ \lambda_2 > 0$, or $\lambda_1 < 0,\ \lambda_2 < 0$.

Now observe first that we can rewrite the voter's optimization problem (5) for choosing B as

$$\max_B \left\{ -C \int_{A \setminus B} f(x|a_1) dx - \lambda_1 C \int_{A \setminus B} f_{a_i}(x|a_1) dx - \lambda_2 C \int_{A \setminus B} f_{a_2}(x|a_2) dx \right\} \tag{17}$$

Suppose that $\lambda_1,\ \lambda_2 > 0$. Then we show that the solution to (17) requires that $A \setminus B = (-\infty, x^*)$ or $B = [x^*, \infty)$. To see this, let $\tilde{a}_i(B)$ denote the optimal action of i given standard $B = [x^*, \infty)$. We assert that $\tilde{a}_1(B) \geq a_1^*$. If not then the standard $(-\infty, \infty)$ would Pareto dominate any $B = [x^*, \infty)$ since $u^1(a_1^*, z_1 a_1^* + z_2 a_2^*) > u^1(\tilde{a}_1(B), z_1 \tilde{a}_1(B) + z_2 \tilde{a}_2(B))$ (the marginal effect of $\tilde{a}_1$ is greater than $\tilde{a}_2$ due to $z_1 > z_2$). Hence $\tilde{a}_1(B) \geq a_1^*$.

Let B solve (17). Then we show that B must satisfy $B \supseteq [\tilde{a}_1(B), \infty)$. Suppose otherwise. Then let $B' = B \cup [\tilde{a}_1(B), \infty)$, and so we have

$$-\int_{\Re \setminus B'} f(x|a_i) dx \geq -\int_{\Re \setminus B} f(x|a_i) dx \tag{18}$$

By the first order stochastic dominance of F, $\int_{-\infty}^{x^*} f_{a_i}(x|a_i) dx \leq 0$ for any x^*. Hence, since B does not contain all the interval $[\tilde{a}_1(B), \infty)$, it follows that

$$-\lambda_i \int_{B \cup [\tilde{a}_1(B), \infty)} f_{a_i}(x|a_i) dx \leq -\int_B f_{a_i}(x|a_i) dx$$

Since $\int_{-\infty}^{\infty} f_{a_i}(x|a_i) dx = 0$,

$$-\lambda_i \int_{\Re \setminus B'} f_{a_i}(x|a_i) dx \geq -\int_{\Re \setminus B} f_{a_i}(x|a_i) dx \tag{19}$$

However, putting together (18) and (19) observe that

$$\begin{aligned} & -\lambda_1 C\int_{\Re\setminus B} f_{a_1}(x|a_1)dx - \lambda_2 C\int_{\Re\setminus B} f_{a_2}(x|a_2)dx - C\int_{\Re\setminus B} f(x|a_1)dx \\ \leq \quad & -\lambda_1 C\int_{\Re\setminus B'} f_{a_1}(x|a_1)dx - \lambda_2 C\int_{\Re\setminus B'} f_{a_2}(x|a_2)dx - C\int_{\Re\setminus B'} f(x|a_1)dx \end{aligned} \tag{20}$$

This contradicts the fact that B solves (17). Therefore, $B \supseteq [\tilde{a}_1(B), \infty)$.

Now let $x^* = inf\{x \in B\}$. Then we have $[x^*, \infty) \supseteq B \supseteq [\tilde{a}_1(B), \infty)$. Given that $u^1 \to -\infty$ as $a_1 \to \infty$, $\tilde{a}_1(B)$ is bounded above. Hence, for any ϵ we choose x^* sufficiently large such that $|x^* - \tilde{a}_i(B)| < \epsilon$. The interval $[x^*, \infty)$ then approximates B arbitrarily closely for large enough x^*. However, the strict concavity of the citizen's problem allows one to employ the Theorem of the Maximum to show that $\tilde{a}_1([x^*, \infty))$ is continuous in x^*. Therefore, the solution to (17) if $\lambda_1 > 0$ and $\lambda_2 > 0$ may be taken to be of the form $[x^*, \infty)$. The argument for why $B = (-\infty, x^*]$ when $\lambda_1 < 0$ and $\lambda_2 < 0$ is completely analogous.

Finally, observe that if $B = [x^*, \infty)$ then from the first order constraint, (3), the chosen activities a_1 and a_2 by types 1 and 2, resp., as functions of x^* are continuous in x^*. Moreover, they satisfy $a_1 > a_1^*$ and $a_2 > a_2^*$. However, since this occurs precisely when $\lambda_i > 0$ for $i = 1, 2$ we also have $u_y^1 > 0$ so that $y < a_1^*$ by equations (15) and (16). But if $a_1 > a_1^*$ while $y < a_1^*$ then the other type must be moving the average behavior y. Hence, Inequality (6) holds. Similarly, Inequality (7) holds whenever $B = (-\infty, x^*]$.

To prove (2), without losing generality, suppose that type 1 is decisive and take B to be of the form $B = [x^*, \infty)$. From (8) the first order condition

$$-\lambda_1 \frac{f_{a_1}(x^*|a_1)}{f(x^*|a_1)} - \lambda_2 \frac{f_{a_2}(x^*|a_2)}{f(x^*|a_1)} - 1 = 0$$

By Property (A1), $\frac{f_{a_i}(x^*|a_i)}{f(x^*|a_i)} \to \infty$ (resp. $-\infty$) as $x^* \to \infty$ (resp. $x \to -\infty$). This means that the left side of this equality is positive for small enough x^* and negative for large enough x^*. By the Intermediate Value Theorem, the left side crosses 0 from above at some interior x^*.

We now prove (4). Let $a_1^* > a_2^*$. By previous arguments, B has the form $B = [x^*, \infty)$ and x^* is finite. We therefore have $a_2^* < a_2 < y < a_1^* < a_1$ by equation (6).

Let f^σ denote the density under which B is chosen and the noise is σ. It suffices to show that for an increment $\Delta\sigma > 0$ it follows that $\Delta x^* < 0$. Roughly speaking, this means that a mean preserving spread of f by increasing σ increases the measure of B by decreasing x^*.

Recall that from the first order condition, we have

$$-\lambda_1 \frac{f_{a_1}^{\sigma}(x^*|a_1)}{f^{\sigma}(x^*|a_1)} - \lambda_2 \frac{f_{a_2}^{\sigma}(x^*|a_2)}{f^{\sigma}(x^*|a_1)} - 1 = 0 \tag{21}$$

where $\lambda_i > 0$ for $i = 1, 2$. Since (21) describes a local maximum, in a neighborhood of x^* the left side of (21) crosses 0 from above as x^* is approached from the left. It suffices then to show

$$\frac{d}{d\sigma}\left[-\lambda_1 \frac{f_{a_1}^{\sigma}(x^*|a_1)}{f^{\sigma}(x^*|a_1)} - \lambda_2 \frac{f_{a_2}^{\sigma}(x^*|a_2)}{f^{\sigma}(x^*|a_1)} - 1\right] \ < \ 0. \tag{22}$$

Observe that since the optimal choices of a_1 and a_2 satisfy $a_1 > a_2$ it follows that $f_{a_1}^{\sigma}(x^*|a_1) < f_{a_2}^{\sigma}(x^*|a_2)$. This means that (21) can only be satisfied if $f_{a_1}^{\sigma}(x^*|a_1) < 0$. By Property (A2), $\frac{d}{d\sigma}\left[-\lambda_1 \frac{f_{a_1}^{\sigma}(x^*|a_1)}{f^{\sigma}(x^*|a_1)}\right] < 0$.

Given σ observe that by equations (15) and (16) $\lambda_2 \to 0$ as $z_2 \to 0$. Hence, letting $\frac{d}{d\sigma}\left[-\lambda_1 \frac{f_{a_1}^{\sigma}(x^*|a_1)}{f^{\sigma}(x^*|a_1)}\right] = -\epsilon < 0$, choose z_2 small enough (consequently $z_1 = 1 - z_2$ sufficiently large) so that $|\lambda_2 \frac{f_{a_2}^{\sigma}(x^*|a_2)}{f^{\sigma}(x^*|a_1)}| < \epsilon$. Hence, for this choice of (z_1, z_2), (22) is proved. □

Proof of Proposition 2 We define the formal stochastic game for this dynamic model. Recall that A is a finite grid in $\Re$. Let

$$\Omega \equiv \{\mathcal{B} \subset A : \ \mathcal{B} \text{ is bounded } \} \cup \{\emptyset\}$$

Now fix the state $\mathcal{B}_0$. Then define

$$\Omega_0 \equiv \{\mathcal{B} \subset \mathcal{B}_0 : \ \mathcal{B} \in \Omega\}$$

The feasible states are then given by the finite set $\bar{\Omega}_0 = \Omega_0 \times \{1, 2\}$. A typical element of $\bar{\Omega}_0$ is a pair $(\mathcal{B}, j)$ where j is the identity of the decisive type. Note that since any interval $\mathcal{B}$ is associated with a point in $(x^1, x^2) \in A^2$ which gives the left end point and right end point, resp., it follows that $\Omega = \{(x^1, x^2) \in \Re^2 : \ \ x^1 \leq x^2\}$. This means that $\Omega_0 = \{(x^1, x^2) \in \Re^2 : \ x_0^1 \leq x^1 \leq x^2 \leq x_0^2\}$. Therefore, the feasible state space is a finite subset in $\Re^3$.

A Markovian strategy can then be represented by a function $\mathcal{S}^i : \bar{\Omega}_0 \to A$ which gives the end point $\mathcal{S}^i(\mathcal{B}, i) = x_i^*$ of the half interval either $[x_i^*, \infty)$ or $(-\infty, x_i^*]$ depending on whether i's ideal is to the right or to the left of the rival type. Note that this formulation of a Markovian strategy is different but equivalent to the one given in the main body of the paper. Without loss of generality, suppose that $a_1^* > a_2^*$ in the sequel. For each $i = 1, 2$, and each $(\mathcal{B}, j) \in \bar{\Omega}_0$, define the mapping $\Pi^i_{\mathcal{S}}$ by

$$\Pi^i_{\mathcal{S}}(\mathcal{B}, j) \;=\; \begin{cases} V_i(\mathcal{B}|\mathcal{S}) & if\ j = i \\ \\ W_i(\mathcal{B}, \mathcal{S}_j(\mathcal{B})|\mathcal{S}) & if\ j \neq i. \end{cases}$$

Now let $\Lambda_i(\bar{\Omega}_0)$ denote the space of such mappings by varying $\mathcal{S}$. For now fix $i = 1$. Define the operator $T_1 : \Lambda_1(\bar{\Omega}_0) \to \Lambda_1(\bar{\Omega}_0)$ by

$$T_1\Pi^1_{\mathcal{S}}(\mathcal{B}, j) \;=\; \begin{cases} \sup\limits_{B} \Big[(1-\delta)U_i(B, G(\mathcal{B})) + \delta p \Pi^1_{\mathcal{S}}(\mathcal{B} \cap B, 1) + \delta(1-p)\Pi^1_{\mathcal{S}}(\mathcal{B} \cap B, 2)\Big] & if\ j = 1 \\ \\ \Pi^1_{\mathcal{S}}(\mathcal{B}, 2) & if\ j = 2. \end{cases}$$

We have an analogous definition for T_2. Because future states $\mathcal{B}'$ are defined by the intersection $\mathcal{B} \cap B$, the states in $\bar{\Omega}_0$ are nonrecurrent. Hence, for each $\mathcal{S} = (\mathcal{S}^1, cS^2)$ there exists $\bar{\mathcal{S}} = (\bar{\mathcal{S}}^1, \bar{\mathcal{S}}^2)$ such that $T_1\Pi^1_{\mathcal{S}\setminus\bar{\mathcal{S}}^1} = \Pi^1_{\mathcal{S}\setminus\bar{\mathcal{S}}^1}$ and $T_2\Pi^2_{\mathcal{S}\setminus\bar{\mathcal{S}}^2} = \Pi^2_{\mathcal{S}\setminus\bar{\mathcal{S}}^2}$. Note that we have not established that $\bar{\mathcal{S}}^i$ is a best reply against $\bar{\mathcal{S}}^j$. The operator T_i implicitly defines a best reply correspondence for type i, denoted BR_i. The best reply $\bar{\mathcal{S}}^i \in BR_i(\mathcal{S})$ satisfies: for all $\mathcal{B} \in \Omega_0$, all types $j = 1, 2$, and for all $\hat{\mathcal{S}}^i$,

$$\Pi^i_{\bar{\mathcal{S}}}(\mathcal{B}, j) \geq \Pi^i_{\bar{\mathcal{S}}\setminus\hat{\mathcal{S}}^i}(\mathcal{B}, j) \tag{23}$$

To show existence of MPE now amounts to showing that (23) holds.[24] A standard argument shows that BR_i is nonempty valued (see Denardo (1967)). Unfortunately, a standard fixed point theorem such as Kakutani cannot be employed since BR_i is not convex valued because it maps to the finite grid A. This poses no problem, however, since the choices are purely asynchronous. This means that (23) need only be satisfied in states $(\mathcal{B}, i)$ — i.e., those in which i is decisive. Therefore let

$$\Pi_{\mathcal{S}}(\mathcal{B}, i) \equiv \Pi^i_{\mathcal{S}}(\mathcal{B}, i)$$

for each state $(\mathcal{B}, i)$ and each Markovian strategy $\mathcal{S} = (\mathcal{S}^1, \mathcal{S}^2)$. Now define the operator T to satisfy $T = T_i$ when $\Pi_{\mathcal{S}} = \Pi^i_{\mathcal{S}}$. Observe that by construction, $T\Pi_{\bar{\mathcal{S}}} = \Pi_{\bar{\mathcal{S}}}$. Hence, this fixed point of T defines a standard policy function g which satisfies $g(\mathcal{B}, i) = \bar{\mathcal{S}}^i(\mathcal{B}, i)$. By construction, g satisfies (23) for each i, and so $\bar{\mathcal{S}}$ is a Markov Perfect equilibrium. □

Proof of Proposition 3 Fix a MPE $\mathcal{S}$. Let $\{\mathcal{B}_t\}$ denote an MPE path of constitutional standards to date. Let $\mathcal{B} \equiv \bigcap_t \mathcal{B}_t$. The question that remains is whether there exists B^1, B^2

[24]Notice that we restrict our attention to best responses to Markovian strategies. A standard argument shows that best responses in the class of Markovian strategies also constitutes a best response in the class of all fully history contingent strategies (see, for example, Friedman (1986)).

such that $V_i(\mathcal{B}|\mathcal{S}) = \bar{V}_i(B^1, B^2)$. Suppose that i is decisive. By definition,

$$V_i(\mathcal{B}|\mathcal{S}) = (1-\delta)U_i(\mathcal{S}^i(\mathcal{B}), G(\mathcal{B}))+\delta[pV_i(\mathcal{B}\cap\mathcal{S}^i(\mathcal{B})|\mathcal{S})+(1-p)W_i(\mathcal{B}\cap\mathcal{S}^i(\mathcal{B}), \mathcal{S}^j(\mathcal{B}\cap\mathcal{S}^i(\mathcal{B}))|\mathcal{S})] \tag{24}$$

If $\mathcal{S}^i(\mathcal{B}) \not\supset \mathcal{B}$ then $\mathcal{S}^i(\mathcal{B}) \cap \mathcal{B} \subset \mathcal{B}$ (where "$\subset$" denotes strict subset) which violates the fact that $\mathcal{B}$ is the limiting standard. Hence, $\mathcal{S}^i(\mathcal{B}) \supseteq \mathcal{B}$. Also we must have $\mathcal{S}^j(\mathcal{B}) \supseteq \mathcal{B}$. This implies that $\mathcal{B} = \mathcal{S}^i(\mathcal{B}) \cap \mathcal{B}$. Observe then that equation (24) can be rewritten as

$$V_i(\mathcal{B}|\mathcal{S}) = (1-\delta)U_i(\mathcal{S}^i(\mathcal{B}), G(\mathcal{B})) + \delta[pV_i(\mathcal{B}|\mathcal{S}) + (1-p)W_i(\mathcal{B}, \mathcal{S}^j(\mathcal{B})|\mathcal{S}) \tag{25}$$

Also, $W_i(\mathcal{B}, \mathcal{S}^j(\mathcal{B})|\mathcal{S})$ can be expressed as

$$W_i(\mathcal{B}, \mathcal{S}^j(\mathcal{B})|\mathcal{S}) = (1-\delta)U_i(\mathcal{S}^j(\mathcal{B}), G(\mathcal{B})) + \delta[(1-p)V_i(\mathcal{B}|\mathcal{S}) + pW_i(\mathcal{B}, \mathcal{S}^j(\mathcal{B})|\mathcal{S}) \tag{26}$$

Recursively solving for $V_i(\mathcal{B}|\mathcal{S})$ in (25) and (26) gives

$$V_i(\mathcal{B}|\mathcal{S}) \;=\; \frac{1-\delta p}{1+\delta-2\delta p}U_i(\mathcal{S}^i(\mathcal{B}), G(\mathcal{B})) + \frac{\delta(1-p)}{1+\delta-2\delta p}U_i(\mathcal{S}^j(\mathcal{B}), G(\mathcal{B})) \;=\; \bar{V}_i(\mathcal{S}^1(\mathcal{B}), \mathcal{S}^2(\mathcal{B}))$$

□

Proof of Proposition 4 Recall that $a_1^* > a_2^*$. For an arbitrary $r \in A$ let

$$B_r^i = \begin{cases} [a_1^* - r, \infty) & if \quad i = 1 \\ \\ (-\infty, a_2^* + r] & if \quad i = 2 \end{cases}$$

Moreover, let $\sigma_r = G(\mathcal{B} \cap [a_1^* - r, a_1^* + r])$ denoting the auditing parameter induced in the steady state by r.

We define a Markovian strategy $(\mathcal{S}_1, \mathcal{S}_2)$ as follows. For any state $\mathcal{B}$ each voter chooses $\mathcal{S}_i(\mathcal{B}) = B_r^i$ such that $r \in A$ optimizes the program (14) given the current state. Clearly, this strategy is Markovian since a solution to (14) depends only on the current state, $\mathcal{B}$. Also, this strategy induces a payoff which converges to the value of the program (14) as $\delta \to 1$. We now verify that pair constitutes a Markov Perfect equilibrium.

Now for some initial state $\mathcal{B}$ let r^* denote a solution to (14). We must show there is some δ sufficiently large such that for each i, each state $\mathcal{B}$, and for each potential defection B^i,

$$\begin{aligned} V_i(\mathcal{B}|S) \;&\equiv\; (1-\delta)U_i(B_{r^*}^i, G(\mathcal{B})) + \delta pV_i(\mathcal{B} \cap B_{r^*}^i|S) + \delta(1-p)W_i(\mathcal{B} \cap B_{r^*}^i, B_{r^*}^j|S) \\ &\geq\; (1-\delta)U_i(B^i, G(\mathcal{B})) + \delta pV_i(\mathcal{B} \cap B^i|S) + \delta(1-p)W_i(\mathcal{B} \cap B^i, \mathcal{S}_j(\mathcal{B} \cap B^i)|S) \end{aligned} \tag{27}$$

Notice that as part of the equilibrium, i anticipates that starting with next period, each type $j = 1, 2$ (which includes future incarnations of type i) will subsequently choose B^j_{r*} to implement the symmetric solution to (14) if i chooses B^i_{r*} in the current period. If B^i is a potential defection, then the MPE continuation implements some new steady state (B^1_r, B^2_r) where possibly $r \neq r^*$.

Observe that any i's payoff if he follows this strategy, i.e., his payoff correponding to the left side of Inequality (27) can be rewritten as

$$\begin{aligned}
& (1-\delta)\left\{U_i(B^i_{r*}, G(\mathcal{B})) \ + \ \sum_{t=1}^{\infty}(\delta p)^t U_i(B^i_{r*}, G(\mathcal{B} \cap B^i_{r*}))\right\} \\
& \delta(1-p)\sum_{t=0}^{\infty}(\delta p)^t \left\{(1-\delta)U_i(B^j_{r*}, G(\mathcal{B} \cap B^i_{r*})) \ + \ \delta[p\bar{W}_i(B^1_{r*}, B^2_{r*}) + (1-p)\bar{V}_i(B^1_{r*}, B^2_{r*})]\right\} \\
= \ & (1-\delta)\left[U_i(B^i_{r*}, G(\mathcal{B})) - U_i(B^i_{r*}, G(\mathcal{B} \cap B^i_{r*}))\right] \\
& + \frac{1-\delta}{1-\delta p}\left[U_i(B^i_{r*}, G(\mathcal{B} \cap B^i_{r*})) + \delta(1-p)U_i(B^j_{r*}, G(\mathcal{B} \cap B^i_{r*}))\right] \\
& + \frac{\delta^2(1-p)}{1-\delta p}\left[\beta_{\delta,p}U_i(B^i_{r*}, \sigma_{r*}) + (1-\beta_{\delta,p})\ U_i(B^2_{r*}, \sigma_{r*})\right]
\end{aligned} \tag{28}$$

where $\beta_{\delta,p} = \frac{1-p}{1+\delta-2\delta p}$.

Observe that the payoff in (28) can be written as the sum of a transient payoff and a steady state payoff. As $\delta \to 1$, the transient payoff goes to zero. Now let

$$T^i_\delta(r^*) \equiv [U_i(B^i_{r*}, G(\mathcal{B})) - U_i(B^i, G(\mathcal{B} \cap B^i_{r*}))] + \frac{U_i(B^i, G(\mathcal{B} \cap B^i_{r*})) + \delta(1-p)U_i(B^j_{r*}, G(\mathcal{B} \cap B^i_{r*}))}{1-\delta p}$$

denoting the transient part,[25] and let

$$P^i_\delta(r^*) \equiv \frac{\delta(1-p)}{1-\delta p}\left[\beta_{\delta,p}U_i(B^i_{r*}, \sigma_{r*}) + (1-\beta_{\delta,p})\ U_i(B^2_{r*}, \sigma_{r*})\right]$$

denoting the permanent, steady state part of the payoff in (28). Rewriting the left side of (29) in terms of these functions, we have

$$V_i(\mathcal{B}|S) = (1-\delta)T^i_\delta(r^*) + \delta P^i_\delta(r^*)$$

We can also rewrite the right side of (29) in terms of these functions: if i deviates and chooses B^i instead of B^i_{r*} he obtains

$$(1-\delta)U_i(B^i, G(\mathcal{B})) + \delta p[(1-\delta)T^i_\delta(r) + \delta P^i_\delta(r)] + \delta(1-p)[(1-\delta)T^j_\delta(r) + \delta P^j_\delta(r)]$$

[25]Warning: the notation T_δ is distinct from the operator T in Proposition 2.

where r is a solution to (14) given state $\mathcal{B}\cap B^i$, and T^j_δ and P^j_δ are the transient and permanent parts of i's payoff, resp., as type j makes the initial choice B^j_r. Clearly, $(1-\delta)T^i_\delta(r)+\delta P^i_\delta(r) > (1-\delta)T^j_\delta(r)+\delta P^j_\delta(r)$ since the B^1_r and B^2_r are symmetric and, therefore, generate the same signalling noise. Hence, i's payoff when he chooses B^i_r cannot be worse (by construction) than the symmetric payoff when j chooses B^j_r.

In terms of these functions, it suffices to show: for all $r \in A$.

$$(1-\delta)[T^i_\delta(r^*) - T^i_\delta(r)] + \delta[P^i_\delta(r^*) - P^i_\delta(r) - U_i(B^i, G(\mathcal{B}))] \;\geq\; 0 \tag{29}$$

Now observe that $|\alpha_{\delta,p} - \beta_{\delta,p}| \to 0$ as $\delta \to 1$. Therefore $P^i_\delta(r) \to \bar{V}(B^1_r, B^2_r)$ as $\delta \to 1$. In the limiting case of $\delta = 1$, any maximizer of the program (14) is also a maximizer of $P_1(r)$.

Now let

$$\delta_1 = \inf\{\delta \in [0,1) : \; P^i_\delta(r^*) \geq P^i_\delta(r), \; \forall r \in A\}$$

Since r is chosen from A, which is a finite grid, $\delta_1 < 1$. Hence, $\delta \geq \delta_1$ implies that r^* maximizes P_δ.

Define

$$\epsilon \equiv \min_{\{r\in A:\, r\neq r^*\}} \frac{P^i_\delta(r^*) - P^i_\delta(r)}{|U_i(B^i, G(\mathcal{B})) + T^i_\delta(r) - T^i_\delta(r^*)|}$$

Again, since A is a finite grid, it follows that $\epsilon > 0$. Now let

$$\delta_2 \geq \frac{1}{1+\epsilon}$$

We now have that for any $\delta \geq \max\{\delta_1, \delta_2\}$, the Inequality in (29) holds, and so the candidate Markovian strategy is a Markov Perfect equilibrium. We conclude the proof. $\square$

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